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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : Confirmation No. 4491

Toshiyuki KAWAGUCHI et al. : Docket No. 2003-0407A

Serial No. 10/603,762 : Group Art Unit 2832

Filed June 26, 2003 : Examiner Marina Fishman

PUSH-BUTTON SWITCH MEMBER AND
MANUFACTURING METHOD OF SAME

THE COMMISSIONER IS AUTHORIZED
TO CHARGE ANY DEFICIENCY IN THE
FEES FOR THIS PAPER TO DEPOSIT
ACCOUNT NO. 23-0975

REQUEST FOR RECONSIDERATION

**RESPONSE UNDER 37.CFR 1.116
EXPEDITED PROCEDURE
EXAMINING GROUP 2832**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the final Office Action dated July 28, 2004, the Applicants respectfully request reexamination and reconsideration of the application in view of the following remarks.

In item 2 on page 2 of the Office Action, claims 19, 22, 29, 32-33, 36, 43 and 45 were rejected under 35 U.S.C. § 102(b) as being anticipated by Tanabe (U.S. 5,871,088). This rejection is respectfully traversed for the following reasons.

Claims 19 and 33 each recite a push-button switch member comprising a transparent electrode which is disposed so as to oppose the base electrode and to contact with the display section. The transparent electrode, as recited in claims 19 and 33, is continuously and integrally formed in a range including and between a side surface and an upper surface of the key-top portion. Further, as recited in claims 19 and 33, the transparent electrode comprises a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline.

Tanabe discloses an EL sheet diaphragm which includes an illuminatable diaphragm portion 2. The diaphragm portion 2 includes a transparent electrode layer 4. The transparent

electrode layer 4 is formed in a surface of Polyethylene terephthalate (PET) film 3, which is sequentially laminated by a light emitting layer 5, a dielectric layer 6, a rear electrode layer 7 and an insulating layer 8 (see Column 2, lines 44-58 and Figure 2). Accordingly, Tanabe discloses that the transparent electrode 4 is formed from a conductive polymer of PET.

In rejecting claims 19 and 33, the Examiner asserted that by disclosing a transparent electrode 4 which is formed from a conductive polymer of PET, Tanabe discloses a transparent conductive polymer consisting of polythiophene. In particular, at the top of page 3 of the Office Action, the Examiner asserted that “it is well known polyethylene is a specie[s] of polythiophene.” To support this assertion, the Examiner cited Saito et al. (U.S. 6,595,653) as “indicat[ing] that polyethylene is [a] polythiophene species conductive polymer” (see top of page 7 of the Office Action). Accordingly, based on the Examiner’s interpretation of the disclosure of Saito et al., the Examiner concluded that polyethylene is a species of polythiophene.

However, the Applicants respectfully disagree with the Examiner’s interpretation of Saito et al. Saito et al. discloses that the transparent conductive film 2 is not limited to vapor-depositing ITO (indium-tin oxide) on PET (polyethylene terephthalate). Alternatively, Saito et al. discloses that the transparent conductive film 2 may be a conductive polymer instead of vapor-depositing ITO on PET. If the transparent conductive film 2 is a conductive polymer, Saito discloses that a polythiophene species conductive polymer is preferable as the conductive polymer of the transparent conductive film 2. Saito et al. discloses that Polyethylene dioxithiophene, not polyethylene, is preferred as the species of the polythiophene conductive polymer of the transparent conductive film 2 (see Column 2, lines 50-59).

Accordingly, Saito et al. clearly does not disclose that polyethylene is a species of polythiophene. Instead, Saito et al. clearly discloses that Polyethylene dioxithiophene, not polyethylene, is a species of polythiophene.

Despite this clear disclosure of Saito et al., the Examiner interpreted Saito et al. as “indicat[ing] that polyethylene is [a] polythiophene conductive polymer.” Notwithstanding the fact that Tanabe discloses a Polyethylene terephthalate (PET) film 3, not a polyethylene film, and notwithstanding the fact that Saito et al. discloses that Polyethylene dioxithiophene, not

polyethylene, is preferred as the species of the polythiophene conductive polymer of the transparent conductive film 2 of Saito et al., the Examiner asserted that the “polyethylene” disclosed in Tanabe anticipates the transparent conductive polymer consisting of polythiophene of the present invention.

However, regardless of whether Tanabe is interpreted as disclosing a polyethylene film or a polyethylene terephthalate film, the Applicants strongly disagree with the Examiner’s assertion that polyethylene is a species of polythiophene.

Contrary to the Examiner’s assertion, neither polyethylene nor polyethylene terephthalate are species of polythiophene.

Initially, the Applicants respectfully submit that it is improper for the Examiner to selectively remove compounds from the materials which are disclosed in Saito et al. in order to arrive at the compounds recited in claims 19 and 33. As described above, Saito et al. discloses that polyethylene dioxithiophene, not “polyethylene,” is preferred as the species of the polythiophene conductive polymer of the transparent conductive film 2 (see Column 2, lines 50-59).

Polyethylene, a simple polymer, is composed of chains of repeating -CH₂- units (see page 1204 of Appendix submitted herewith). Polyethylene terephthalate (PET) is a fiber forming polyesters which are prepared from terephthalic acid or its esters. PET is a condensation polymer which is produced from the monomers ethylene glycol, HOCH₂CH₂OH, a dialcohol, and dimethyl terephthalate, CH₃O₂C—C₆H₄—CO₂CH₃, a diester (see pages 1204-1205 of Appendix).

On the other hand, polythiophene is composed of repeating units of -C₄H₄S- (thiophene) (see page 1473 of Appendix). Accordingly, thiophene (polythiophene), as shown on page 1473 of Appendix, clearly requires a sulfur (S) group in its composition. Polyethylene dioxithiophene, which, as correctly described in Saito et al., is a species of thiophene. Polyethylene dioxithiophene, however, is only a species of thiophene (polythiophene) because polyethylene dioxithiophene includes dioxithiophene.

However, neither polyethylene nor PET includes a thiophene group. Therefore, neither polyethylene nor PET are a species of thiophene or polythiophene.

Therefore, even with the disclosure of Saito et al., Tanabe clearly does not disclose or suggest a transparent electrode comprising a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Accordingly, claims 19 and 33 are clearly not anticipated by Tanabe since Tanabe fails to disclose or suggest each and every limitation recited in claims 19 and 33.

In item 4 on page 3 of the Office Action, claims 20-21 and 34-35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanabe. As described above, Tanabe clearly does not disclose or suggest each and every limitation of claims 19 and 33. Therefore, Tanabe also fails to disclose or suggest the limitations recited in claims 20-21 and 34-35 which depend from claims 19 and 33, respectively.

In item 5 on page 4 of the Office Action, claims 23-28, 30-31, 37-42 and 44 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanabe in view of Lemarchand et al. (EP 0,981,144). The Applicants will hereinafter refer to U.S. 6,416,196 to Lemarchand et al. (hereinafter “Lemerchand et al.”) in the following remarks since Lemerchand et al. is an English language translation of EP 0,981,144.

As described above, Tanabe clearly does not disclose or suggest each and every limitation of claims 19 and 33. For the following reasons, the Applicants respectfully submit that Lemarchand et al. does not cure the deficiencies of Tanabe for failing to disclose or suggest a transparent electrode comprising a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Lemarchand et al. discloses a push-button switch member 1 which uses a transparent conducting ink (ITO) for the transparent electrode 6 (see Column 3, lines 24-45). Further, Lemarchand et al. also discloses that a conducting track 213 is made of the conducting ink (see Column 5, lines 26-28). Accordingly, Lemarchand et al., similar to Tanabe, also clearly does not disclose or suggest a transparent electrode comprising a transparent conductive polymer which is

selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Therefore, neither Tanabe nor Lemarchand et al., either individually or in combination, disclose or suggest a transparent electrode comprising a transparent conductive polymer which is selected from the group consisting of a derivative of polypyrrole, a derivative of polythiophene and a derivative of polyaniline, as recited in claims 19 and 33.

Accordingly, no obvious combination of Tanabe and Lemarchand et al. would result in the inventions of claims 19 and 33 since neither Tanabe nor Lemarchand et al., either individually or in combination, disclose or suggest each and every limitation of claims 19 and 33.

Furthermore, because of the clear distinctions discussed above, the Applicants respectfully submit that no obvious combination of Lemerchand et al. and Tanabe would result in the inventions of new claims 19 and 33 since Lemerchand et al. and Tanabe each fail to disclose or suggest each and every limitation of new claims 19 and 33. Furthermore, it is submitted that the clear distinctions discussed above are such that a person having ordinary skill in the art at the time the invention was made would not have been motivated to modify Tanabe and Lemerchand et al. in such a manner as to result in, or otherwise render obvious, the present invention as recited in claims 19 and 33. Therefore, it is submitted that claims 19 and 33, as well as claims 20-32 and 34-45 which depend therefrom, are clearly allowable over the prior art as applied by the Examiner.

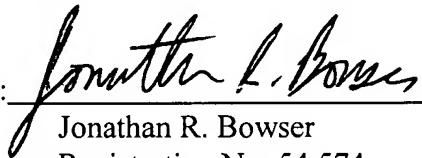
In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice thereof is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

Toshiyuki KAWAGUCHI et al.

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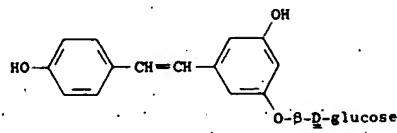
1989

Cl/molecule: 6.30. d_4^{20} 1.555; d_4^{55} 1.566. Distillation range 385-420. No open cup flash point to boiling. n_D^{20} 1.647-1.649. Dielectric constant (1000 cycles) 4.3 (25°); 3.7 (100°). LD₅₀ orally in weanling rats: 1315 mg/kg (Kimbrough).

Caution: Toxic effects in humans include chloracne, pigmentation of skin and nails, excessive eye discharge, swelling of eyelids, distinctive hair follicles, gastrointestinal disturbances. In Japan, accidental contamination of rice bran oil with Kanechlor 400 led to an outbreak of what became known as "Yusho disease", see M. Kuratsune et al., in EPA-560/6-75-004, loc. cit., p 14. Toxic symptoms in animals include hepatocellular carcinoma, hypertrophy of the liver, adenofibrosis, weight and hair loss, mouth and eyelid edema, acneform lesions, decreased hemoglobin + hematocrit, gastric mucosal ulceration and reduced ability to reproduce. These substances may reasonably be anticipated to be carcinogens: Fourth Annual Report on Carcinogens (NTP 85-002, 1985) p 170.

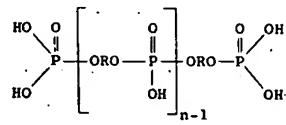
USE: In electrical capacitors, electrical transformers, vacuum pumps, gas-transmission turbines. Formerly used in U.S. as hydraulic fluids, plasticizers, adhesives, fire retardants, wax extenders, dedusting agents, pesticide extenders, inks, lubricants, cutting oils, in heat transfer systems, carbonless reproducing paper.

7542. Polydatin. 3-Hydroxy-5-(2-(4-hydroxyphenyl)ethylphenyl-β-D-glucopyranoside; 3-hydroxy-5-(p-hydroxystyryl)phenyl glucoside; 3',4'-trihydroxystilbene-3-β-D-glucoside; resveratrol-3-β-mono-D-glucoside; piceid. C₂₀H₂₂O₈; mol wt 390.40. C 61.53%, H 5.68%, O 32.79%. Isoln from fresh root of *Polygonum cuspidatum* Sieb. & Zucc., *Polygonaceae*, and structure: Nonomura et al., *Yakugaku Zasshi* 83, 988 (1963).



Trihydrate, crystals, mp 225-226°. $[\alpha]_D^{25} -74.9^\circ$ (c = 1.709 in ethanol).

7543. Polyestradiol Phosphate. Estradiol phosphate polymer; PEP; Estradurin. Polymeric ester of phosphoric acid and estradiol. Mol wt ~26,000. Prepn: Diczfalusy, *Endocrinology* 54, 471 (1954); Diczfalusy et al., U.S. pat. 2,928,849 (1960 to AB Leo); Fernö et al., *Acta Chem. Scand.* 12, 1675 (1958). Proposed structure: Fernö et al., loc. cit.

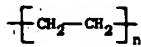


(-ORO- is the estradiol radical and n is about 80)

Solid, mp 195-202°. Very sol in aq pyridine; sol in aq alkali; very slightly sol in ethanol, ethanol + water (1:1), water, dioxane, acetone, chloroform. Intrinsic viscosity [η] in 0.25M NaCl soln at pH 7.5 = 0.04.

THERAP CAT: Estrogen (used in prostatic carcinoma).

7544. Polyethylene. Ethene homopolymer; Agilene; Alathon; Alkathene; Courlene; Lupolen; Platilon; Polythene; Pylen; Reevon. Mol wt about 1500-100,000. C 85.7%, H 14.3%. Prepd by polymerization of liq ethylene at high temps and high or low pressure. Reviews: Aggarwal, Sweeting, *Chem. Rev.* 57, 665-742 (1957); Raff, Allison, *Polyethylene*, vol. XI of High Polymers series (Interscience, New York, 1956); Faith et al., *Industrial Chemicals* (Wiley, New York, 3rd ed., 1965) pp 624-630.



Plastic solid of milky transparency. d_4^{20} 0.92. Tough and flexible at room temps, mp 85-110°. Breaks with cryst fracture at -50°. Good electrical insulator. Surface resistivity: 10¹⁴ ohms. Will burn, but hardly supports combustion. Stable to water, non-oxidizing acids and alkalies, alcohols, ethers, ketones, esters at ordinary temps. Attacked by oxidizing acids such as nitric acid and perchloric acid, free halogens, benzene, petr ether, gasoline and lubricating oils, aromatic and chlorinated hydrocarbons.

USE: Laboratory tubing; in making prostheses; electrical insulation; packaging materials; kitchenware; tank and pipe linings; paper coatings; textile stiffeners.

7545. Polyethylene Glycol. α-Hydro-ω-hydroxypoly(oxy-1,2-ethanediyl); macrogol; PEG; Carbowax; Jeffox; Nycoline; Pluracol E; Poly-G; Polyglycol E; Solbase. Liquid and solid polymers of the general formula H(OCH₂-CH₂)_nOH, where n is greater than or equal to 4. In general, each PEG is followed by a number which corresponds to its average mol wt. Synthesis: Fordyce, Hibbert, *J. Am. Chem. Soc.* 61, 1905, 1910 (1939). Reviews: Glycols, G. O. Curme, Jr., F. Johnston, Eds., A.C.S. Monograph Series no. 114 (Reinhold, New York, 1952) pp 176-202; Kastens in *High Polymers*, H. Mark et al., Eds., vol. 13 entitled *Polyethers*, part 1 (Interscience, New York, 1963) pp 169-189, 274-291; G. M. Powell, III in *Handbook of Water-Soluble Gums & Resins*, R. L. Davidson, Ed. (McGraw-Hill, New York, 1980) pp 18/1-18/31.

Clear, viscous liquids or white solids which dissolve in water forming transparent solns. Sol in many organic solvents. Readily sol in aromatic hydrocarbons. Only slightly sol in aliphatic hydrocarbons. Do not hydrolyze or deteriorate on storage, will not support mold growth. Polyethylene glycols are compds of low toxicity: Smyth et al., *J. Am. Pharm. Assoc. Sci. Ed.* 39, 349 (1950). Toxicity data (PEG 400): W. Bartsch et al., *Arzneimittel-Forsch.* 26, 1581 (1976).

Polyethylene glycol 200, average value of n is 4, mol wt range 190-210. Viscous, hygroscopic liq; slight characteristic odor; d_{45}^{25} 1.127. Viscosity (210°F): 4.3 centistokes. Supercools upon freezing.

Polyethylene glycol 400, average value of n between 8.2 and 9.1, mol wt range 380-420. Viscous, slightly hygroscopic liq; slight characteristic odor; d_{45}^{25} 1.128. mp 4-8°. Viscosity (210°F): 7.3 centistokes. LD₅₀ orally in rats: 30 ml/kg (Bartsch).

Polyethylene glycol 600, average value of n between 12.5 and 13.9, mol wt range 570-630. Viscous, slightly hygroscopic liq; characteristic odor; d_{45}^{25} 1.128. mp 20-25°. Viscosity (210°F): 10.5 centistokes.

Polyethylene glycol 1500, average value of n between 29 and 36, mol wt range 1300-1600. White, free-flowing powder; d_{45}^{25} 1.210. mp 44-48°. Viscosity (210°F): 25-32 centistokes.

Polyethylene glycol 4000, average value of n between 68 and 84, mol wt range 3000-3700. White, free-flowing powder or creamy-white flakes; d_{45}^{25} 1.212. mp 54-58°. Viscosity (210°F): 76-110 centistokes. LD₅₀ orally in rats (divided doses): 59 g/kg (Smyth).

Polyethylene glycol 6000, average value of n between 158 and 204, mol wt range 7000-9000. Powder or creamy-white flakes; d_{45}^{25} 1.21. mp 56-63°. Viscosity (210°F): 470-900 centistokes. LD₅₀ orally in rats: > 50 g/kg (Smyth).

USE: As water-soluble lubricants for rubber molds, textile fibers, and metal-forming operations. In food and food packaging. In hair preps, in cosmetics in general. Pharmaceutical aid (ointment and suppository base). As a stationary phase in gas chromatography. Also in water paints, paper coatings, polishes and in the ceramics industry. **Caution:** Solvent action on some plastics!

THERAP CAT (VET): Ointment base.

7546. Polyethylene Terephthalates. PET. Fiber forming polyesters prepnd from terephthalic acid, q.v. or its esters and ethylene glycol: Whinfield, Dickson, U.S. pat. 2,465-319 (1949 to du Pont). Review of structures, definition of trade names: R. W. Moncrieff, *Man-Made Fibres* (John Wiley & Sons, New York, 4th ed., 1963) pp 361-389, 707-723.

γ : d_4^{20} 0.92. Tough and Breaks with cryst fractal. Surface resistivity: γ supports combustion. Is and alkalies, alcohols, emps. Attacked by oxid perchloric acid, free lime and lubricating oils, ions. In prostheses; electrical chenware; tank and pipe liners.

α -Hydro- ω -hydroxypoly-EG; Carbowax; Jeffox; glycol E; Solbase. Linear formula $H(OCH_2)_r$ equal to 4. In general, which corresponds to its Hibbert, J. Am. Chem. Glycols. G. O. Curme, nograph Series no. 114 '6-202; Kastens in High L. 13 entitled Polyethers. 3) pp 169-189, 274-291; Water-Soluble Gums & Graw-Hill, New York,

solids which dissolve in oil in many organic solvents. Only slightly or hydrolyze or deteriorate growth. Polyethylene: Smyth et al., J. Am. O. Toxicity data (PEG-Forsch. 26, 1581 (1976). value of n is 4, mol wt c liq; slight characteris-10°F: 4.3 centistokes.

value of n between 8.2 and us, slightly hygroscopic 28. mp 4-8°. Viscosity ally in rats: 30 ml/kg

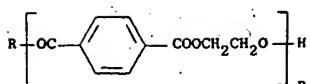
value of n between 12.5 viscous, slightly hygro-128. mp 20-25°. Vis-

value of n between 29 White, free-flowing scosity (210°F): 25-32

value of n between 68 White, free-flowing .212. mp 54-58°. Vis- LD₅₀ orally in rats (di-

value of n between 158 powder or creamy-white usy (210°F): 470-900 50 g/kg (Smyth). or rubber molds, textile is. In food and food es in general. Pharma-base). As a stationary in water paints, paper ics industry. Caution:

s. PET. Fiber form- acid, g.v. or its esters' son, U.S. pat. 2,465, structures, definition of an-Made Fibres. (John 963) pp:361-389, 707-



R = OH, Dacron, Amilar, Fiber V. Solid, dec at approx 250°. Sp gr 1.38. Sol in hot m-cresol, trifluoroacetic acid, o-chlorophenol, a mixture of 7 parts of trichlorophenol and 10 parts (by wt) of phenol, a mixture of 2 parts of tetrachloroethane and 3 parts (by wt) of phenol. Fiber has good resistance to weak acids even at boiling temp, to strong acids in the cold, to weak alkalies, to bleaches, to most alcohols, ketones, soaps, detergents, and dry cleaning agents. Fabric has good resistance to creasing, abrasion, heat aging, and sunlight when behind glass. When "heat-set", fabric will not shrink in either boiling water or boiling drycleaning solvent. Fabric burns, but local melting generally prevents spread of fire. Insects cannot thrive on the fiber, but some can cut through it. Molds, mildew, and fungi may grow on applied finishes, but do not attack fiber.

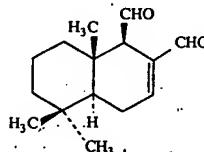
R = OCH₃, Terylene. For physical properties, see Dacron above. Other similar products: Diolen, Enkalene, Fortrel, Tergal, Terital, Terlenka, Trevira, Mylar.

USE: In fabric manufacture; as films; as base for magnetic coatings. Surgical aid (arterial grafts).

7547. Polyferose. Jeffron. An iron carbohydrate chelate contg approx 45% iron in which the metallic (Fe) ion is sequestered within a polymerized carbohydrate derived from sucrose.

THERAP CAT: Hematinic.

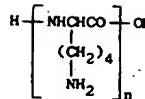
7548. Polygodial. [IR-(1 α ,4 α ,8 $\alpha\alpha$]-1,4,4a,5,6,7,8,8a-Octahydro-5,5,8a-trimethyl-1,2-naphthalenedicarboxaldehyde; tadeonal. C₁₅H₂₂O₂; mol wt 234.34. C 76.88%, H 9.46%, O 13.66%. Widely distributed drimane sesquiterpene with insect antifeedant properties; naturally occurring as the (–)-form. Isoln from *Polygonum hydropiper* L., *Polygonaceae* (Australia) and structure: C. S. Barnes, J. W. Loder, Aust. J. Chem. 15, 322 (1962); from the bark of *Warburgia stuhlmanni* Engl. or *W. ugandensis*, *Canellaceae* (E. Africa): I. Kubo et al., Chem. Commun. 1976, 1013; from nudibranch *Dendrodons limbata* (Mediterranean): G. Cimino et al., Science 219, 1237 (1983); from nudibranchs *D. nigra*, *D. tuberculosa* (Hawaii) and *D. krebssii* (Mexico): R. K. Okuda et al., J. Org. Chem. 48, 1866 (1983). Relationship between structure and antioxidant-activity: K. Nakanishi, I. Kubo, Isr. J. Chem. 16, 28 (1977); M. D'Ischia et al., Tetrahedron Letters 1982, 3295. Partial synthesis: M. J. Cortes et al., Chem. & Ind. (London) 1985, 735. Synthesis of (±)-form: T. Kato et al., Tetrahedron Letters 1971, 1961; S. P. Tanis, K. Nakanishi, J. Am. Chem. Soc. 101, 4398 (1979); M. Jalali-Naini et al., Tetrahedron Letters 1981, 2995; S. C. Howell et al., Chem. Commun. 1981, 507.



Colorless needles from petroleum (40-60°), mp 57° (Barnes, Loder). [α]_D²⁵ -131° (c = 0.96 in ethanol). uv max (ethanol): 231, 295 nm (ε 11800, 76).

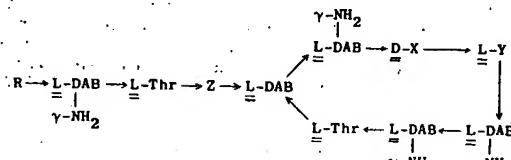
(±)-Form, mp 93-94° (Tanis; Nakanishi).

7549. Polylysine. A lysine polypeptide or homopolymer, the chain length of which varies with the method of prep. Prepn.: Katchalski et al., J. Am. Chem. Soc. 69, 2564 (1947); 70, 2094 (1948); Fasman et al., ibid. 83, 709 (1961); Sela et al., Biopolymers 1, 517 (1963); Strojny, White, U.S. pat. 3,215,684 (1965 to Dow).



L-Form hydroiodide, average dp (or n) = 32. Transparent, solid, film-like polymer. Readily sol in water; practically insol in the usual organic solvents. Transition of high-mol-wt poly-L-lysine (dp 1500) in aq. soln. from a helical to a randomly coiled conformation under the influence of decreasing pH or increasing temp: Applequist, Doty, C.A. 58, 6925b (1963).

7550. Polymyxin. Antibiotic complex produced by *Bacillus polymyxa*: Brownlee, Jones, Biochem. J. 43, XXV (1948). Prepn: Ainsworth, Pope, U.S. pat. 2,565,057 (1951 to Burroughs Wellcome); Petty, U.S. pat. 2,595,605 (1952 to Am. Cyanamid); Benedict, Stodola, U.S. pat. 2,771,397 (1956 to USDA). Purification: Hastings et al., Brit. pat. 782,926 (1957 to Distillers Co.). Polymyxins A, B, C, D, E, F, K, M, P, S and T have been identified. Isoln of polymyxins A, B, C and E: Few, Schulman, Biochem. J. 54, 171 (1953); of polymyxin D: Stansley et al., Bull. Johns Hopkins Hosp. 81, 43 (1947); of polymyxin F: W. L. Parker et al., J. Antibiot. 30, 767 (1977); of polymyxin K: Kimura, Japan. pat. 16,152(71), C.A. 75, 62180r (1971); of polymyxin M: Khokhlov et al., C.A. 55, 5653h (1961); of polymyxin P: Kimura et al., J. Antibiot. 22, 449 (1969); of polymyxin S₁ and polymyxin T₁: J. Shoji et al., ibid. 30, 1029 (1977). Resolution of polymyxin B into B₁ and B₂: Hausmann, Craig, J. Am. Chem. Soc. 76, 4892 (1954). Structure and synthesis of polymyxin B₁: Wilkinson, Lowe, Nature 202, 1211 (1964); Vogler et al., Helv. Chim. Acta 48, 1161 (1965). Structure of polymyxin B₂: Wilkinson, Lowe, Nature 204, 993 (1964). Separation of polymyxin-D into D₁ and D₂, and structures: Hayashi et al., Experientia 22, 354 (1966). Structure of polymyxin S₁: J. Shoji et al., J. Antibiot. 30, 1035 (1977); of polymyxin T₁: eidem, ibid. 1042. Review: Vogler, Studer, Experientia 22, 345-354 (1966); Paulus, "Polymyxins" in Antibiotics II, D. Gottlieb, P. Shaw, Eds. (Springer-Verlag, New York, 1967) pp 254-267.



DAB = α,γ -diaminobutyric acid

Obtained as the hydrochloride. Nearly colorless powder, dec 228-230°. $[\alpha]_D^{20} -40^\circ$ (c = 1.05). The hydrochloride is very sol (more than 40%) in water and methanol. The solv decreases in the higher alcs. Practically insol in the usual ethers, esters, ketones, hydrocarbons, and the chlorinated solvents. Forms water insol salts with a number of ppts such as picric acid, helianthic acid, Reinecke salt. The free base is slightly sol in water; almost insol in alc.

Polymyxin B. Mixture of polymyxins B₁ and B₂. $[\alpha]_{D,5461}^{20} -106.3^\circ$ (1N HCl).

Polymyxin B sulfate, Aerosporin. Solubilities: Weiss et al., Antibiot. & Chemother. 7, 374 (1957). Mixture with trimethoprim, Polymyxin.

Polymyxin B₁, C₅₆H₉₂N₁₆O₁₃, R = (+)-6-methyloctanoyl; X = phenylalanine; Y = leucine; Z = L-DAB.

Polymyxin B pentahydrochloride, C₅₆H₁₀₂Cl₅N₁₆O₁₃, white powder. $[\alpha]_D^{25} -85.11^\circ$ (c = 2.33 in 75% ethanol).

Polymyxin B₂, C₅₅H₉₀N₁₆O₁₃, R = 6-methylheptanoyl; X = phenylalanine; Y = leucine; Z = L-DAB. $[\alpha]_{D,5461}^{20} -112.4^\circ$ (2% acetic acid).

Polymyxin D₁, C₅₉H₉₃N₁₅O₁₅, R = (+)-6-methyloctanoyl; X = leucine; Y = threonine; Z = D-serine.

Polymyxin D₂, C₄₉H₉₁N₁₅O₁₅, R = 6-methylheptanoyl; X = leucine; Y = threonine; Z = D-serine.

is been used as catalytic ether with male-

nol wt 207.90. Br. Prepd from thionyl n, *Compt. Rend.* 122, ullman, *Inorg. Syn.* 1, 1p - 52°. bp₇₇₃ 138°; thionyl chloride. Dec bottles. Hydrolyzed to form, carbon tetr-

eyes, mucous mem-

oxychloride. Cl₂OS; %, S 26.95%. SOCl₂; ir dichloride with sulf- (1893); Edwards, U.S. rochemical); Fehér in Chemistry, vol. 1, G. York, 2nd ed., 1963 pp nds" in Kirk-Othmer vol. 19 (Interscience, 1. Purification by dis- ed oil: Martin, Fieser, Alternate methods of Soc. 68, 1380 (1946); ats. 3,155,457; 3,156,- Friedman, Wetter, J.

sh, fuming, refractive 0 1.655; d₄²⁰ 1.638. mp 517. Dec when heated with benzene, chloro-

strongly irritating and s and eyes.
to replace OH or SH with Grignard reagents view of use in organic ents. vol. 1 (John Wiley,

difluoride. F₂OS; mol 7.26%. SOF₂. Usually uoride on thionyl chlo- pentafluoride: Booth, (1940); Smith, Muetter- also be prepared by the yl chloride: Kemmitt, 3-229 (1965).

Does not attack glass cylinders. mp - 129.5° - 100°. 1.780. d (solid; .6. Very slowly hydro- benzene.
respiratory tract.

thiodihydro-5-(1-methyl-dinedione monosodium barbituric acid sodium arbutal sodium; thiopenthal Sodium; Nesdonal; Thiothal Sodum. C₁₁- 49.98%, H 6.48%, N 13%. Prepn: U.S. pats. Prepn of nonhygroscopic 1,001 (1963 to Abbott). *Toxicol. Appl. Pharmacol.*



Yellowish-white, hygroscopic powder. Alliaceous, garlic-like odor. Sol in water, alcohol. Insol in ether, benzene; petr ether. Aq solns are alkaline to litmus. Solns dec on standing; on boiling precipitation occurs. LD₅₀ in mice (mg/kg): 149 i.p.; 78 i.v. (Christensen; Lee).

Note: Sterile Thiopental Sodium is a mixture of sterilized thiopentol sodium (91.7%) with anhydr sodium carbonate as a buffer. A 2.5% w/v soln in water is strongly alkaline, having a pH of about 10.5.

Caution: May be habit forming. This is a controlled substance (depressant) listed in the U.S. Code of Federal Regulations, Title 21 Parts 329.1 and 1308.13 (1987).

THERAP CAT: Anesthetic (intravenous).

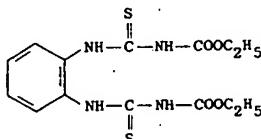
THERAP CAT (VET): Short-acting anesthetic.

9281. Thiopeptin. Thiofeed. Sulfur containing peptide antibiotic complex produced by *Streptomyces tateyamensis* no. 7906: Miyairi et al., Ger. pat. 1,929,355 (1969 to Fujisawa), C.A. 72, 88921w (1970). Consists of the a and b series of thiopeptins A₁, A₂, A₃, A₄, and B (major component). Structurally similar to thiostrepton, q.v. Biological and chemical studies: Miyairi et al., *Antimicrob. Ag. Chemother.* 1, 192 (1972). Characterization of thiopeptins B: Miyairi et al., *J. Antibiot.* 23, 113 (1970); structural studies: Muramatsu et al., *ibid.* 25, 537 (1972); 30, 383 (1977). Total structures of components: O. D. Hensens, G. Albers-Schönberg, *Tetrahedron Letters* 1978, 3649.

Thiopeptins B, faint yellow crystals, mp 219-222° (dec). [α]_D²⁵ - 80° (c = 1 in chloroform). uv spectrum (methanol): shoulders at 230-250, 295, 305 nm. Sol in dioxane, DMSO, DMF, pyridine, chloroform. Insol in ether, benzene, n-hexane, petr ether, water. Fairly sol in methanol, acetone, ethyl acetate.

THERAP CAT (VET): Antibiotic feed additive.

9282. Thiophanate. [1,2-Phenylenebis(iminocarbonothioyl)]biscarbamic acid diethyl ester; 4,4'-o-phenylenebis[3-thioallophanic acid]diethyl ester; 1,2-bis(3-ethoxycarbonyl-2-thioureido)benzene; Cercobin; Topsin; Nemafax. C₁₄H₁₈N₄O₄S; mol wt 370.44. C 45.39%, H 4.90%, N 15.12%, O 17.28%, S 17.31%. Prepn: Noguchi et al., Ger. pat. 1,806,- 123 (1969 to Nippon Soda Co.), C.A. 71, 70347h (1969). corres to U.S. pats. 3,745,187 and 3,769,308 (both 1973). Photodegradation: H. Buchenauer et al., *Pestic. Sci.* 5, 343 (1973). Activity against nematode infection in ruminants: Eichler, *Brit. Vet. J.* 129, 533 (1973). Toxicological studies in animals: *idem, ibid.* 130, 570 (1974).



Colorless plates, mp 195°. LD₅₀ orally in mice and rats: > 15 g/kg (Eichler).

O,O-Dimethyl analog, C₁₂H₁₄N₄O₄S, *thiophanate-methyl*, Cercobin-M, Topsin-M. See above for prepn. Persistence in soil: J. R. Fleeker et al., *J. Agr. Food Chem.* 22, 592 (1974). Pharmacological properties: Hashimoto et al., *Toxicol. Appl. Pharmacol.* 23, 616 (1972). Toxicity data: *idem, ibid.* 606. Colorless prisms, mp 181.5-182.5°. Sol in acetone, methanol, chloroform, acetonitrile. Slightly sol in other organics; insol in water. LD₅₀ in rats, mice, guinea pigs, rabbits (g/kg): 3.40, 6.64, 3.64, 2.27 orally (Hashimoto).

USE: Systemic fungicide.

THERAP CAT (VET): Anthelmintic.

9283. Thiophene. Thifuran; thiolfuran; thiole; thiotetrole; divinylene sulfide. C₄H₆S; mol wt 84.14. C 57.10%, H 4.79%, S 38.11%. Found in coal tar, in coal gas, and in technical benzene: V. Meyer, *Ber.* 16, 1471 (1883); 17, 2642 (1884). Made available in commercial quantities by a process utilizing the dehydrogenation of butane with sulfur as the dehydrogenating agent, followed by cyclization with sulfur to form the thiophene ring: Rasmussen, Ray, *Chem. Inds.* 60, 593, 620 (1947). Laboratory prepn by heating sodium succinate with phosphorus trisulfide: R. Phillips, *Org. Syn. Coll. vol. II*, 578 (1943). Also prepd by passing

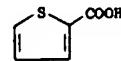
ethylene or acetylene into boiling sulfur; or by passing acetylene and hydrogen sulfide over hot bauxite or nickel hydroxide: U.S. pat. 1,421,743, C.A. 16, 3093 (1922). Review: B. Buchholz in Kirk-Othmer *Encyclopedia of Chemical Technology* vol. 22 (Wiley-Interscience, New York, 3rd ed., 1983) pp 965-973.



Liquid. Slight aromatic odor resembling that of benzene. d₄⁰ 1.0873; d₄²⁰ 1.0573; d₄⁵⁰ 1.0285. mp - 38.3°. bp₇₆₀ 84.4°; bp₄₀₀ 64.7°; bp₂₀₀ 46.5°; bp₁₀₀ 30.5°; bp₆₀ 20.1°; bp₄₀ +12.5°; bp₂₀ 0.0°; bp₁₀ - 10.9°; bp₅ - 20.8°; n_D²⁵ 1.52684. Absorption spectrum: Purvis, *J. Chem. Soc.* 97, 1653, 1656 (1910). Insol in water; miscible with most organic solvents. May be heated to 850° without decompr.

USE: Solvent similar to benzene, but suitable for lower and higher temps; manuf of resins from thiophene-phenol mixtures and formaldehyde; manuf of dyes and pharmaceuticals.

9284. 2-Thiophenecarboxylic Acid. 2-Thenoic acid. C₅H₄O₂S; mol wt 128.16. C 46.86%, H 3.14%, O 24.97%, S 25.02%. Prepn: Voerman, *Rec. Trav. Chim.* 26, 293 (1907); Sy, de Malleray, *Bull. Soc. Chim. France* 1963, 1276; Gross et al., *Ber.* 96, 1382 (1963).



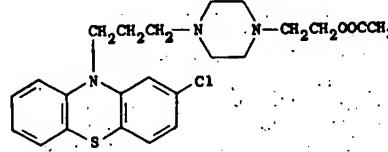
Needles from water, mp 128.5°. Very sol in ether, alc, hot water; moderately sol in CHCl₃; slightly sol in petr ether. Sodium salt, C₅H₃NaO₂S, sodium 2-thiophenecarboxylate, sodium 2-thenoate, Trophires.

USE: Sodium salt as lubricating-grease thickener, Morway, Kolpenbach, U.S. pat. 2,576,031 (1951 to Standard Oil).

9285. Thiophenol. Benzenethiol; phenylmercaptan. C₆H₆S; mol wt 110.17. C 65.41%, H 5.49%, S 29.12%. C₆H₅SH. Prepd by the reduction of benzenesulfonyl chloride with zinc dust in sulfuric acid: Adams, Marvel, *Org. Syn.* 1, 71 (1921).

Liquid. Repulsive, penetrating, garlic-like odor, esp when impure. d₄²⁵ 1.0728; bp₇₆₀ 168.3°; bp₁₀ 103.6°; bp₅₀ 86.2°; bp₂₀ 69.7°; bp₁₀ 18.6°; n_D²⁵ 1.58603. Heat of fusion 24.90 cal/g; spec heat at 25°: 0.3829; entropy at 25°: 52.6. Insol in water. Very sol in alc; miscible with ether, benzene, CS₂. Feebly acidic. Oxidizes in air, esp when dissolved in alcoholic ammonia, forming diphenyl disulfide, C₆H₅SSC₆H₅. The hydrogen of the SH group is easily replaced by metals.

9286. Thiopropazate. 4-[3-(2-Chlorophenoxythiazin-10-yl)propyl]-1-piperazineethanol acetate; 2-chloro-10-[3-[1-(2-acetoxyethyl)-4-piperazinyl]propyl]phenothiazine; 10-[3-[1-(2-acetoxyethyl)-4-piperazinyl]propyl]-2-chlorophenoxythiazine; N-(2-acetoxyethyl)-N'-(γ-(2'-chloro-10'-phenothiazinyl)propyl)piperazine; 1-(2-acetoxyethyl)-4-[3-(2-chloro-10-phenothiazinyl)propyl]piperazine. C₂₃H₂₈ClN₂O₂S; mol wt 446.00. C 61.93%, H 6.33%, Cl 7.95%, N 9.42%, O 7.17%, S 7.19%. Prepd from 2-chloro-10-(γ-chloropropyl)-phenothiazine and piperazine in butanone followed by treatment with β-bromoethyl acetate in toluene: Cusick, U.S. pat. 2,766,235 (1956); Anderson et al., *Arzneimittel-Forsch.* 12, 937 (1962).



Free base, bp_{0.1} 214-218°. Sol in ether. Dihydrochloride, C₂₃H₃₀Cl₂N₂O₂S, Dartal, Dartalan. Crystals from 95% ethanol, dec 223-229°. Freely sol in water; much less sol in alc, chloroform; almost insol in ether.

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